How G. Bateson informs dogs

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Abstract

Purpose – To show how Bateson's difference which makes a difference can be interpreted from a cybernetic view, i.e. in terms of control theory.

Design/methodology/approach – Depending on the observer's choice of the system boundaries, communication or structural coupling may be recognized. With the help of Bateson's example he uses to explain his term of information the paper demonstrates how the two perspectives can be related to each other and in which way his metalogical "hypothesis non fingo" reflects this refraction of perspectives.

Findings – Hypotheses describing structural coupling in the perspective of communication become explanations which then in circularity are verified by structural coupling. In his example Bateson describes a structural coupling between a dog owner and his dog in order to explain how he informs dogs.

Originality/value – Provides information on Bateson's theory of explaining

Keywords Communication, Cybernetics, Structural analysis

Paper type Conceptual paper

A difference which makes a difference

Bateson defined the term information as a "difference which makes a difference". But the meaning of this simple phrase is subject to as many interpretations as there are people who quote it. I would like to show that the phrase can be read in a cybernetic way, in a narrower sense of the word. I thereby presume that the phrase represents a linguistic shortcut, meaning that it is not a difference which makes a difference, but rather, that all differences are made by observers. And I shall show that "differences make a difference" is exactly what cyberneticists construct.

Bateson (1987, p. 126) uses the following example to illustrate his phrase: I can kick a dog – provided it is small enough – in such a way that I will send it flying through the air or I can kick it in such a way that it will run away. In both cases I will have kicked the dog and I will have got rid of it. If I kick the dog sending it flying through the air, it is my energy that moves the dog. If, on the other hand, I kick the dog only so that it runs away, the dog uses its own energy.

In the first case I am moving the dog, while in the second case I am "informing" the dog, i.e. I am activating or steering the dog's energy with my own energy. If I kick the dog hard enough, the dog will not have to do anything to get away, it will fly through the air. If I do not kick the dog hard enough, the dog will still have to do something; it must use its own legs. The difference which makes the difference consists of whether I am kicking the dog hard or gently. This is a difference within my behaviour. And the difference I am making with this difference lies in whether the dog flies or runs away; but I can see a contingency in the second scenario which creates a lot of confusion: the dog could bite instead of running away.

The example of the dog being kicked is emotionally somewhat complicated. I could – in an initial emotional reaction – ask why Bateson kicks dogs. I could also come to realise that he does not kick dogs after all, but that he only discusses different ways

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dogs can be kicked. The map is not the territory. Even if I do not get the map and the territory mixed up, I could ask why Bateson uses such a cruel example. I would, however, prefer to remain cool though, and only remind the reader that H. Manturana has described what frogs see when their view is distorted, in the real sense of the word, that is by invasive surgery to their eyes.

Bateson's story of the "informed dog" is only very rarely retold, although his difference theorem has become commonplace. I think there are not just dog-emotional reasons for that, but that it is rather because of Bateson is seldom being interpreted as a cybernetician. Although all the essential statements about cybernetics can be found in Bateson's writings, they are usually hidden in subordinate clauses or in footnotes. He normally elucidates his ideas with the help of illustrative examples. In the context of the story about the dog he also uses the image of billiard balls and guns, to explain this phenomenon, a "trick" which life apparently uses all the time, where one form of energy is used to regulate another form of energy.

In cybernetics this trick is described as a transistor or an amplifier. Cybernetic systems I generally call mechanisms with two energy circuits, whereby one form of energy is controlled by another one. The primary (regulated) energy equals functionally the purpose of the mechanism, and the regulating secondary energy serves in a regulatory unit. In a thermostat-controlled heating system for example, oil is transformed into heat in the primary energy circuit. In the secondary energy circuit, i.e. in the thermostat, there is an electricity flow regulating the primary energy circuit. A difference in the thermostat brings about a difference in the oil burner. The secondary energy does not produce any heat, just differences in the heating system. If Bateson kicks the dog gently enough, the dog will not be moved by the kick. In cybernetics the secondary energy is called "signal" and in everyday language we call it "information". A gentle kick "informs" the dog what Bateson would like him to do. In an intended case the dog then enables Bateson to reach his goal by providing its own (primary) energy. If it is big enough it can naturally bark or even bite instead of running away. In this case, in the colloquial sense, it will not have understood the information and in cybernetical terms it will not have reacted "trivially", i.e. like a machine. Cybernetic amplifiers make sense because they allow me to control strong energy by using weak energy and moreover, because I can with the help of little energy of my own make use of strong external energy. The expression amplifier, however, obscures the fact that the energy is not amplified but replaced by another one.

One could slightly "humanise" Bateson's example. If I tell my dog to leave my bed, thus informing him verbally, I will need a lot less energy – especially if it is big – than if I carry him from my bed to his own bed. In this scenario the example becomes more complicated of course, because I am replacing the ingeniously simple, binary distinction of kicking hard enough versus kicking not hard enough with complicated actions of behaviour like talking and carrying around.

Cybernetic systems

I will call cybernetic systems *mechanisms which are equipped with secondary energy circuits serving to control (feedback)*. Ashby described cybernetic mechanisms as immaterial, because they are only used to explain something. If I only want to explain why the room temperature remains the same, I do not actually have to construct the heating system itself maintaining this stability of room temperature. In this view

Bateson's dog which gets thrown through the air is immaterial too. However, the things I explain normally do take place in the physical world.

The book *Cybernetics* by N. Wiener has the subtitle *Control and Communication in the Animal and in the Machine*. I will, since H. Maturana has suggested this, speak of auto- and allopoietic machines instead of animals and machines. In allopoietic, i.e. constructed machines, the engineer will recognise a purpose. A heating system is made to heat. Autopoietic machines, i.e. living beings, on the other hand do not have a purpose. A dog is not made in order to be kicked in one way or another; a dog is not "made" at all. Because on a functional level no purpose can be observed in autopoietic systems, in everyday thinking the pseudo purpose of survival is often attributed to them. But of course, a living being does not live simply to survive. What is cybernetically regulated is not the survival but a primary energy. A heating system on the other hand will not "survive" if regulation of the heat is no longer possible.

According to W. Ashby cybernetic systems are closed with respect to information, i.e information-proof, or in H. Maturana's words, operationally closed. "Control and communication" therefore, will always take place within the system. If I read Bateson from the cybernetical perspective I will have to consider the system boundaries of the communication processes he describes. With regards to the "informed" dog (by kicking), I can either observe Bateson as a system regulating his well-being or I can observe the system "Bateson and dog" regulating the optimum distance between its components. By doing this I am observing the same matter, but I am observing two different systems. As an observer I attribute different cybernetic goals to them in my projected introspection.

If I observe Bateson as the system, I will notice that he selects a way of behaviour in order to steer back to his goal state, which is disturbed by the presence of a dog.

A possible behaviour would be to get rid of the disturbance "dog" which in cybernetics would equal a change of the present state. Another possibility would be to learn to appreciate the dog, which would equal a change of the goal state. If Bateson wants to get rid of the dog, he can do that in either way he described. If the dog walks away, Bateson will revert back to his goal state of undisturbed well-being – until perhaps another dog or something even worse shows up. Therefore, this scenario is not about what the dog does and its reasons for doing it, but rather what is happening within the system Bateson; moreover, that Bateson as a system reacts to the perturbance in such a way that he can aftterwards be undisturbed again. By his behaviour Bateson regulates his own perception. This is what W. Powers elaborated in his *Behaviour: The Control of Perceptions*. A difference in Bateson's behaviour will bring about a difference in his perception. If Bateson kicks the dog, he will afterwards no longer perceive it. In this view the dog exists only as a perception of Bateson because the real dog is situated outside the system Bateson and, therefore, is not perceived.

If I look at Bateson and the dog together as one system, I can conclude that Bateson regulates the dog's behaviour just like a thermostat controls the oil burner belonging to the same heating system. The equilibrium (dynamic balance) of this system can consist of the maintaining of a minimum distance being between Bateson and the dog, just a thermostat heating maintains a minimal temperature. This system is disturbed when the dog – for whatever reason, perhaps because it wants to be stroked or because it wants to bite – steps over the "minimum distance" line, which in turn causes Bateson

to "signal" to the dog to move away again. In this conceptualisation the focus is not on Bateson's well-being but on the goal state of the system "Bateson and dog" where Bateson represents merely an active component. In a thermostat-controlled heating system it is not about whether the thermostat reaches its set point but whether the heating as a whole reaches its set point. The system "Batson and dog" reacts in such a way that a minimum distance is ensured. As an observer I can interpret the goal state of the system as a cybernetic goal which the system strives to arrive at. Relatively early, in "Behaviour, purpose and teleology" N. Wiener made it explicit that cybernetic goals have nothing to do with teleology. In order to avoid confusions between intended and cybernetic goals I will use the word eigenvalue of a system when I mean its cybernetic goal.

Communication

From the cybernetic perspective I am speaking of communication specifically when a system uses its own signals to maintain its own equilibrium. With allopoietic machines this equilibrium is determined by the purpose of the machine, whereas in autopoietic machines it will depend on the various interpretations of the story and the situation. Therefore, it is difficult to tell whether a dog which has been kicked will bite or whether it will run away, unless one knows it very well.

As a cybernetician Bateson reasons – tautologically – exactly according to C. Shannon's cybernetic theory of communication. He uses a sender-receiver-model. A difference within the sender will create a difference in the receiver, whereas the sender and the receiver according to cybernetics always and exclusively are signal modulators of the same system. In a thermostat-controlled heating system the thermostat sends a signal, while the oil burner is the receiver of the signal. And in certain respects the oil burner sends a signal in the form of warmth, which is picked up by the thermostat. I will call this mutual circular process communication, because it steers the system towards its eigenvalue. In the example of Bateson the kick represents the sending of a signal. By leaving, the dog in return changes the feedback signal, which then flows back into Bateson's perception. Bateson and the dog are both senders and receivers of signals. The sender-receiver-model of C. Shannon describes the quantitative aspects of the communication process within a system. It focuses on the signal capacities and the probabilities of their distributions which can be mathematically calculated. Communication forms the constitutive process in cybernetic systems. It always stands for secondary differences which create primary differences.

If I observe the system "Bateson and dog" I am observing neither Bateson nor the dog as a system of their own, they are both part of the same system. As a result, from this perspective, even when the dog is the receiver of the signal sent by Bateson, there is no communication taking place between systems. Regulation and communication take place within the same system.

Following H. von Foerster I will refer to a mechanism of communication as trivial, if on the basis of a signal I am able to predict what is going to happen in a system.

Allopoietic machines are intended to function trivially, but by no means do they do that all the time, as technical problems show. Leaving technical problems aside, I am basically able to predict how an engineered machine will react to a certain signal, since the machine was constructed for exactly this purpose. The oil burner in my heating

system will start to heat every time it receives the corresponding signal from the thermostat. Sufficiently complicated systems such as computers for example very often surprise me, even when they do not have any technical problems, because I only understand in principle, how they function. The "triviality" of a system depends on my ability to predict its reactions, not on the mechanism of the observed system itself. Autopoietic systems surprise me more often, which is hardly surprising, because I might reasonably expect surprises. Very often though they too act in a trivial way, otherwise Bateson could not just kick the dog, if he wanted to get rid of him. In the concept of trivial reaction Bateson could view it as a technical problem if the dog bites him instead of running away; he could be surprised by the unpredictability of the dog, although autopoietic machines are in principle not predictable.

C. Shannon says that information (itself) does not have any meaning. The meaning of a signal lies in the interpretation assigned to the system. With allopoietic machines the constructor of the machine defines what the user will want to achieve with a certain signal. The engineer of an anti-blocking-system ABS, for example, interprets the signal which is triggered by stepping on the brake pedal as a wish to stop the vehicle as quickly as possible. But rally drivers sometimes press the brake pedal in order to block the wheels to make it easier getting round certain bends. In this case the intended meaning is not attributed to the signal, which is equivalent to the user not realising the purpose of the system. In an allopoietic sense the meaning of a signal is constructed, even in a case where I, as an outside observer, do not understand the machine. A computer acts exactly according to how it is constructed to act, naturally also in a case where it – in relation to the intended purpose – displays constructional faults. This is why Windows operated computers regularly collapse, something which cannot be distinguished from real technical breakdowns, because they do follow the program, as it is.

Autopoietic systems by contrast are not determined in this functional sense, because they do not have a purpose the determination could be directed to. On the structural level – as mechanisms – they too are determined, of course. The nervous system, for example, cannot change infinitely from any one condition to another.

Structural coupling

Of course I may also look at a dog as an autopoietic system. In this case I will observe him in a similar way as I observe Bateson. The dog controls his own perception by means of its behaviour. It will for example run away if it experiences kicks, which will result in it no longer experiencing any kicks. As an autopoietic system the dog has a contingent number of options of behaviour possibilities. It too will have to evaluate or learn which behaviour will help it to compensate perturbations.

If I observe Bateson and the dog simultaneously as two individual autopoietic systems, I may notice that their behaviour is structurally coupled to each other.

Every time Bateson seeks to re-establish his equilibrium with a kick, the dog tries to establish its equilibrium by running away. The structural coupling manifests itself in that both of them are only able to be successful with their behaviour if the other system acts accordingly. The structural coupling can only be observed from the outside. The operationally closed system itself is unaware of any structural coupling, because it can only perceive itself, but not its environment, or in other words, expressed in more cybernetical terms, because it only reacts to its own conditions, for example to different

conditions of their own retina. Therefore, both systems are unaware of this coupling; they are only aware of what is working.

I would like to explain the structural coupling using an ecological example. Plants for example, produce oxygen as a waste product of the metabolism of their autopoiesy, which in return is used by humans for their autopoiesy. Reversely, human beings produce nitrogen which is used by plants. But I do not produce nitrogen as an article of trade for plants, and plants already produced oxygen before there were any breathing beings able to use it. The system "human being" and the system "plant" are in this context indispensable for each other. But the reverse system is simply an existing environmental property which has not developed as a result of intention or coordination.

By structural coupling I therefore refer to processes I am locating in a space amongst systems and which, in a differently chosen system, could be described as communication. Structural coupling is an expression for individually observed systems; communication on the other hand, is – also etymologically – an expression of the mutual, or, of a unity of the difference within a system. Bateson and the dog can be seen as either part of the same system or as two different systems being structurally coupled.

The term "structural coupling" is part of the system theory of H. Manturana, who elaborates the necessity of a logical book-keeping with regards to the chosen perspectives (Maturana and Varela, 1992, p. 147). From the cybernetical perspective I will have to register whether I am talking about one system or about various systems. Doubling the perspectives makes me aware of each of the chosen perspectives. However, here we are not concerned with a question of a particular point of view, but rather with a systems theory-based method, according to which systems are viewed as operationally closed in order to win an additional perspective.

Explanations

Bateson and the dog as systems react to themselves. Now, in principle, both of them might question why the condition of their retina varies in accordance with their own behaviour. To perform this question H. Maturana tells us the story about a *kybernetes* (steersman) of a submarine, who successfully navigates his submarine – which he has never left – on the basis of eigenvalues which are represented in the instruments of the submarine, therefore, in blind-flight manoeuvre. From the outside world the *kybernetes* is offered an explanation. He is told that the conditions of his system (his eigenvaulues) mirror the reality outside the ship. H. Manturana points out, that the *kybernetes* does not need this explanatory view from the outside and that he cannot examine it, he is only able to believe in it or to accept it. This kind of explanations, H. Manturana says, are therefore social relations.

Bateson could explain the relation between his kicking and his perceptions to himself with the hypothesis that there is a real dog out there who really runs away because of kicks. However, he offered another, a more cybernetical suggestion.

"Hypothesis non fingo"

Bateson wrote several "Metalogues" in which he talks to his daughter. They can be read as second order observations, as dialogues about dialogues, which reveal the cybernetic perspective. In one of the metalogues his daughter asks:

"Daddy, what is an instinct?" (Bateson, 1999, pp. 73-96). Bateson answers: "An instinct is an explanatory principle. Explanatory principles explain nothing; or they will explain just anything". Explanatory principles are at the end of explanations which introduce hypotheses that cannot be examined.

For cybernetic explanations – this is what G.Bateson suggests in this metalogue – orientate to I. Newton's postulate: "Hypothesis non fingo". I will translate I. Newtons phrase (which Bateson intentionally did not translate in the metalogue) – as: I do not fabricate strange explanations which in reality I do not want to examine after all. As a scientist I construct explanations which represent generative mechanism and, therefore, systems. By doing this I am making myself aware of what I am trying to explain and what I presuppose as facts in my explanations, when constructing the mechanism.

If, for example, the thermometer shows that my child's temperature is 40° and I do not like that, I can give my child medication to lower the temperature as a compensating measure. An implicit hypothesis could be that this medication fights fever. But I am not testing this hypothesis; I am applying it as a fact (as in Latin facere), by giving the medication to my child. I will keep taking this measure if it leads to the goal state and I will replace it if it does not achieve it. If my child – because it has to take medication – stops to manipulate the thermometer, the temperature displayed on it will decrease without my child's temperature getting lower. But I will continue with my measures of applying medication in this case as well, because it leads to the temperature on the thermometer getting lower. That the temperature on the thermometer should be related to the body temperature of my child and that the medication lowers fever are hypotheses which I do not have to make up, they are contingent, therefore not necessary but possible. It is crucial that I am neither investigating the hypothesis with my measurement nor that I am presupposing it. Cybernatically thinking I am only exploring whether a certain measure of compensation is viable with regards to a certain perturbation.

The coupling as an explanation

Bateson kicks the dog. By this measure he regulates his well-being. It is observable to him, whether he is able to compensate the perturbation in the form of a perceived dog by the means of a kick. This constitutes the hypothesis he subjects to a practical falsification attempt. Any further hypotheses, for example the hypothesis that the dog out there in the world really exists, he does not examine by that. But naturally, Bateson too can observe dog owners in his environment interacting with their dogs and the dogs' resulting behaviour. He can, as an outside observer, construct a structural coupling between the observed systems and use it in order to explain the outcomes resulting from his own behaviour. In a kind of a re-entry he is therefore able to observe from the outside how he communicates as a dog owner with his own dog. He then uses the structural coupling he observes to model the interpretation of his own behaviour.

The communication process within the system Bateson produces an image into the system Bateson of him communicating with a system in his environment. In this representation, the dog, in the situation of a "communicative kick" appears to react to a message from the outside. Bateson is aware that there are no dogs which are able to do that. But it is a good thing anyway, that it is possible to inform dogs in this way.

Epilogue

I do read the implied cybernetics of Bateson as a theory of explaining. Every cybernetic explanation is based on differences which make a difference. By making different choices of the system, i.e. I can observe only Bateson or him and the dog, I try to become aware of the "fiction" meaning the constructed nature of my explanations. The choice of the system ostensible leads to whether I will perceive communication or structural coupling. The "doubled" choice of the system by which I understand communication and structural coupling as an entity of difference, qualifies my fiction. I would have to be a dog to know what it is like to be kicked by Bateson. But I do not have to be Bateson to make the differences he suggested.

References

Bateson, G. (1987), *Geist und Natur. Eine notwendige Einheit*, Suhrkamp, Frankfurt.

Bateson, G. (1999), *Ökologie des Geistes. Anthropologische, psychologische, biologische und epistemologische Perspektiven*, Suhrkamp, Frankfurt.

Maturana, H.R. and Varela, F.J. (1992), *Der Baum der Erkenntnis. Die biologischen Wurzeln des menschlichen Erkennens*, Goldmann, München.

Appendix. Dmitry Fedotov (Russia) comments as the Batesonian interpretation

Fedotov's reply

I understand that my comment can appear not quite appropriate for I am Russian and the author (I guess) is a German and for both of us English is a foreign language. Nevertheless, I take the risk to assume that the author failed to recognize that "difference that makes a difference" is one more Bateson's play on words and took literally what was meant as a sort of a joke.

Difference, being a "nonsubstantial phenomenon not located in space or time" (Bateson, *Mind and Nature*) cannot "make" anything. English "to make a difference" is an idiomatic construction which means "to be of importance" "to matter". So "difference that makes a difference" is a "difference that matters". Bateson points out that we are surrounded by countless differences, but only a very few of them really matter (the absolute majority of them simply do not exceed response threshold). In *Mind and Nature* Bateson explains this perfectly clear:

> Kant argued long ago that this piece of chalk contains a million potential facts (*Tatsachen*) but that only a very few of these become truly facts by affecting the behaviour of entities capable of responding to facts. For Kant's *Tatsachen*, I would substitute *differences* and point out that the number *of potential* differences in this chalk is infinite but that very few of them become *effective* differences (i.e. items of information) in the mental process of any larger entity. *Information* consists of differences that make a difference.

So "difference that makes a difference" is an effective difference, difference that matters and which triggers a chain of secondary, tertiary, etc. differences, that transforms (Batesonian term) the initial difference.

It is important to stress (as Bateson did many times) that this subsequent differences are exactly triggered (not "made") by the initial difference. "Difference is a nonsubstantial phenomenon not located in space or time" and therefore can "make" nothing. The factual "maker" of the secondary difference is an active, responsive and energized substrate through which this difference (an elementary idea) travels.

As to "Bateson's dog" yes this story is very famous and was told by Bateson many times. But I do not think this story was told (to illustrate "difference that makes a difference") or that aim of Bateson's kick was "to get rid of the dog" or "to regulate the optimum distance" between him and dog. The purpose of this story (or rather comparison of the situation when man kicks a dog with

the situation when one billiard ball hits another) was to clarify the difference between *Pleroma* and *Creatura* – world of nonliving matter and world of living organisms. In this respect the outcome when dog turns back and bites the one who kicked her (instead of following the vector of physical impulse like Newtonian body should) – is not at all a "surprise" but is exactly the positive goal of the demonstration.

Bateson was reiterating that speculations on dimensional physical variables like "distance" or "energy" can hardly be adequate to explain the behaviour of living systems. Specially this relates to "conservation of energy". Indeed, according to Prigogine's notion of "dissipative structures" life is nothing but one big waste of energy. Living systems are concerned with conservation of ideas, or more specifically "descriptive propositions".

In another story Bateson told many times – the story of acrobat on a tight wire – this extremely energy-consuming activity is not concerned with regulating any physical variable, but with maintaining the ongoing truth of the descriptive proposition "I am a good acrobat and therefore I'm ON a tight wire, not under it".

Quite in the same way the aim of the Bateson's kick (with all it's obvious energy-consuming consequences) was to maintain the ongoing truth of the descriptive proposition "I am a good epistemologist and therefore I know how to demonstrate *Pleroma–Creatura* difference very clearly". And in this respect – paradoxically – it really served to "regulate Bateson's well-being".

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Moscow, Russia, December 2006

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